DOCUMENT RESUME

ED 346 065 SP 033 825

AUTHOR Floden, Robert E.; Buchmann, Margret
TITLE Between Routines and Anarchy: Preparing Teachers for Uncertainty. Occasional Paper No. 138.
INSTITUTION Michigan State Univ., East Lansing. Inst. for Research on Teaching.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE Apr 92
NOTE 23p.; This paper will be a chapter in the forthcoming book, "Detachment and Concern: Topics in the Philosophy of Teaching and Teacher Education" edited by Margret Buchmann and Robert E. Floden (New York: Teachers College Press).
AVAILABLE FROM The Institute for Research on Teaching, College of Education, Michigan State University, East Lansing, MI 48824-1034 ($2.50).
PUB TYPE Viewpoints (Opinion/Position Papers, Essays, etc.) (120)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Decision Making; Elementary Secondary Education; *Evaluative Thinking; Higher Education; *Interpretive Skills; Preservice Teacher Education; *Teacher Education Curriculum; *Teaching (Occupation)
IDENTIFIERS *Uncertainty Reduction

ABSTRACT

Many aspects of teaching reveal it to be an activity imbued with uncertainty. Teachers are frequently unsure of their students' knowledge and understanding, of the effects of their instructional strategies, of the most appropriate content to cover in their limited time with students, and ultimately of their own intellectual and social authority. This paper explores what it would mean to prepare teachers, as adult learners, for uncertainty. Initial inclincations to reduce teachers' uncertainty through the introduction of routines or through more extensive subject matter study may be misguided, however, for whereas too much uncertainty may promote anarchy, too little uncertainty may engender dogmatism. Teacher educators might instead consider introducing their students to the myriad uncertainties they will face in their work, assist them in learning to judge when it may be desirable to increase certainty, and encourage them to view remaining uncertainties as an essential driving force in teaching. (Author)

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Robert E. Floden and Margret Buchmann

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Published by

The Institute for Research on Teaching
College of Education
Michigan State University
East Lansing, Michigan 48824-1034

April 1992

This work is sponsored in part by the Institute for Research on Teaching, College of Education, Michigan State University. The Institute for Research on Teaching is funded from a variety of federal, state, and private sources including the United States Department of Education and Michigan State University. The opinions expressed in this publication do not necessarily reflect the position, policy, or endorsement of the funding agencies.

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Abstract

Many aspects of teaching reveal it to be an activity imbued with uncertainty. Teachers are frequently unsure of their students' knowledge and understanding, of the effects of their instructional strategies, of the most appropriate content to cover in their limited time with students, and ultimately of their own intellectual and social authority. Initial inclinations to reduce teachers' uncertainty through the introduction of routines or through more extensive subject matter study may be misguided, however, for whereas too much uncertainty may promote anarchy, too little uncertainty may engender dogmatism. Teacher educators might instead consider introducing their students to the myriad uncertainties they will face in their work, assist them in learning to judge when it may be desirable to increase certainty, and encourage them to view remaining uncertainties as an essential driving force in teaching.

BETWEEN ROUTINES AND ANARCHY: PREPARING TEACHERS FOR UNCERTAINTY[1]

Robert E. Floden and Margret Buchmann[2]

> Certain: 1. Determined, fixed, settled; not variable or fluctuating, unfailing. 2. Sure, unerring, not liable to fail; to be depended upon; wholly trustworthy or reliable. 3. Established as a truth or fact to be absolutely received, . . . not to be doubted, disputed or called in question; indubitable; sure. 4. Of persons: Fully confident upon the ground of knowledge, or other evidence believed to be infallibile; having no doubt; assured; sure.
>
> The Oxford English Dictionary

Teaching is evidently and inevitably uncertain. No teacher can be sure how a lesson will go or exactly what a student will learn. No one can know which teaching approach will guarantee success for particular groups of students. While casual observation and systematic research indicate the importance of multiform uncertainties to the ways teachers think and feel about their work, little has been published about the stance teacher educators should take toward uncertainty. Writings about teacher education stress how much teachers can learn. Reviews of the literature describe the "knowledge bases" of teaching. Essays advocate knowledge and skills for effective instruction or working with diverse students. Because residual uncertainties of teaching are largely neglected in teacher education, we explore what it would mean to prepare teachers for uncertainty.

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[1]This paper will be a chapter in the forthcoming book, Detachment and Concern: Topics in the Philosophy of Teaching and Teacher Education, edited by Margret Buchmann and Robert E. Floden (New York: Teachers College Press). Many of the ideas in this paper were presented earlier in Robert E. Floden and Christopher M. Clark's "Preparing Teachers for Uncertainty," Teachers College Record, 89, 505-534.

[2]Robert E. Floden, professor of teacher education and educational psychology at Michigan State University, was a senior researcher with the Conceptual Analysis of Teaching Project. Margret Buchmann, professor of teacher education at MSU, is coordinator of the project.

Uncertainties in Teaching

Since academic learning is a primary goal of teaching, it is especially troubling that teachers are seldom sure about what their students know and what they are learning (Jackson, 1986). Uncertainty about student understanding results both from people's variable interpretations of subject matter concepts and from the limits of educational measurement.

Uncertain Assessments of Student Learning

Drawing on their personal--sometimes idiosyncratic--beliefs and experiences, individuals construct meanings. Usually these meanings are comparable enough to permit interaction, but their significant variations make teachers unsure about what students learn. Studies of student conceptions provide dramatic examples of misassessments that stem from these difficulties. Take the case of a student named Benny (Erlwanger, 1973): Benny's classroom used a system of individualized instruction in which students worked through a set of written materials on each topic, then took an exam on that topic. If they did poorly, students could inspect the answers given in the key, then take an alternate version of the test. This cycle could be repeated until the student's answers matched a high proportion of those in the key. Only answers that matched the key exactly were acceptable, however. If the answer was given as "1 1/2," "1.5" would be marked wrong.

Benny made sense of this instructional environment by seeing mathematics as a wild goose chase in which he had to find rules for getting acceptable answers. The system's insistence on an exact match with the answer key supported his conviction that his rules might be right, even if answers were initially marked wrong. When he or the teacher's aide checked his unit tests against the answer book, for example, Benny reconciled differences between his

own understandings and the book's solutions by an expanded idea of which numbers are equivalent. Just as 1/2 is equivalent to 2/4, he reasoned, his answer (1.5) was probably the same as that given in the answer book (1/5). Despite regular testing, Benny's misunderstandings remained invisible; in fact, he experienced consistent success within this system of instruction.

Classroom tests are a means for ranking students and assigning grades. But because no test is perfectly reliable and valid, any nontrivial inference people draw from test performance is open to error. A mistake may stem from carelessness or fatigue rather than a lack of knowledge. A correct answer may be no more than a lucky guess or a fortunate misunderstanding of the question. Test results might also depend more on vocabulary than on students' knowledge of American history. Though themselves imperfect means of assessment, clinical interviews can probe the limits and distortions of other test formats. Discussions can reveal degrees and kinds of understanding that differ from those an essay or multiple-choice exam indicates.

Uncertainty is compounded when teachers have responsibility for teaching many things to many students. Moreover, some areas of knowledge are easier to assess than others (Frederiksen, 1984). Recall of facts and mastery of simple skills may be relatively easy to assess; still, results are not indubitable. A clinical interview may clarify one child's understanding of photosynthesis, but no teacher can spend an hour interviewing each student on every major concept. Important areas--such as the ability to respond to complex, changing situations (like those that teachers face)--probably require elaborate individual assessments difficult to implement and to interpret. Limitations of time, energy, and measurement expertise imply that teachers must get by on general indicators of student learning and reasonable guesses.

Uncertainties in testing and grading can surprise and trouble novices. Their own teachers appeared firm and confident--even inflexible--about the grades they assigned; but when these beginners give tests or read essays, they see that the common means of assessing understanding are far from fail-safe. The impersonality, importance, and finality of grading make teachers feel especially uncomfortable about this source of their uncertainty.

Uncertain Teaching Effects

Even if teachers had a good idea of how much students know, they would remain uncertain about links between teaching and learning. The belief that students will grasp focal concepts if teachers provide clear explanations and engage students in tasks closely tied to the content is often disappointed. Students' behavioral, emotional, and cognitive responses are affected by the contexts in which they live, of which school is only one (albeit, for some, an important one). The child whose creative writing suddenly improves may have been inspired by a parent's comment, not by the teacher's language arts unit. The student who has never completed her homework can turn in a carefully composed essay. The lesson that has always excited students can miscarry with this year's class. Although experienced teachers have some sense of how students will react to a lesson or assignment, some uncertainty remains.

Research on teaching and learning can contribute to understanding teaching effects, but it cannot provide means to engineer classroom success. Research offers illuminating concepts and pointers toward the relative overall merits of different teaching approaches. It has not, and will probably never, permit accurate predictions of what this child will learn from this lesson taught in this way by this teacher in this school. Certainty decreases even further when one considers a person's education over 10 or 20 years. The

long-term effects of teaching are variable and surprising. This is driven home to teachers whenever someone testifies to the importance of a lesson or comment that seemed insignificant to the teacher at the time.

Uncertainties About Instructional Content

Though often taken for granted, the instructional content teachers hope to get across--mathematics, history, or language arts--harbors several uncertainties. Bounds for content choices may (or may not) be set by guidelines, materials, and collegial agreements. Each teacher, however, faces significant, difficult decisions about coverage and emphasis (Schwille et al., 1983). Some decisions are global, such as how much to emphasize facts and rules and how much to stress relationships among concepts and broad understanding; other decisions are more specific, such as how much time to spend studying the Spanish-American War. Teachers must plan what to cover today, how to structure this week's unit, and what units to include this year.

Uncertainties springing from teachers' own imperfect subject matter understandings are added to uncertainties about what to cover. It is no scandal that high school teachers probably know less than Nobel laureates or that elementary school teachers probably know less about ecosystems than high school biology teachers. Although degrees of imperfection in content knowledge are understandable, they still leave teachers uncertain about the concepts to teach, especially for topics that seemed elusive in college. The range of content in schools, coupled with the comparative brevity of teachers' content studies, implies that they can expect to teach many things about which their understanding falls short of the best scholarship.

Further studying, however, will not bring certainty. The deeper one goes into a subject, the more one gets insight into ongoing disputes, disputes

that often divide a field with little chance of resolution. Influenced by Thomas Kuhn (1970), some might go so far as to say that scientific disputes will be settled by politics or charisma rather than reason (e.g., Feyerabend, 1975). Although scholars are guided by disciplinary methods and principles, they can not rest assured of their interpretations. Nor are their inferences sealed off from personal history and local circumstance. Moreover, scholarly interpretations can be tenable while conflicting. In a sense, the better one's education, the greater and more varied are one's uncertainties. Of course, this lack of assurance provides some protection against dogmatism. For better or worse, some uncertainties about subject matter will therefore survive, no matter how well the teachers are educated.

Teachers' Uncertain Authority

Uncertainties about assessment, teaching effects, and instructional content merge in an overarching uncertainty about teacher authority in the classroom. Recognizing their uncertain intellectual footing, teachers may feel that they have little reason to contradict pupils who assert their own interpretations. Teachers are unsure about how much students already know, about what will happen if students go along with the planned lesson, and about whether the claims in the text are really the last word on the subject at hand. While having to make decisions, teachers have no unshakable bases for choosing one academic task or form of classroom organization over another.

For beginners, uncertainty about managerial authority is more salient than uncertainty about intellectual authority (Veenman, 1984). Novice teachers want students to like them and may even feel more affinity with students than with colleagues. Yet they have to maintain discipline and assign grades. Often, beginning teachers rightly doubt their capacity to

control students. The common advice not to smile until Christmas suggests a solution that reduces uncertainty, but such simple escapes from self-doubts may not be the most appropriate ways of coping.

Questions of authority are complicated by teachers' moral obligation to respect students' personal autonomy (Strike, 1982). People have a right to hold opinions. Indeed, teachers often strive to foster student self-expression and autonomy. Yet teachers have a potentially conflicting obligation to help shape logical and aesthetic standards for judgment (Elbow, 1986). Tensions between preserving student autonomy and exercising intellectual and social leadership in the classroom are perennial.

On Being Prepared for Uncertainties

What should educators do to prepare future teachers for their uncertainties? One deceptively attractive answer is that they should warn teachers of the myriad uncertainties and give them the wherewithal to reduce those uncertainties to a minimum. This "know [and smite] thine enemy" approach has advantages but is incomplete and somewhat misguided. Teachers should know how to reduce some uncertainties by developing routines, their knowledge, and skills. But the quest for certainty needs to be tempered and supplemented with ways to teach responsibly in the presence of uncertainties.

Is More Certainty Always Better?

Certainty has its advantages. If one could predict results of action accurately, one could choose the most efficient strategies for desired outcomes. If teachers could be more certain about the effects of different teaching approaches, they might choose instructional strategies based on probable impact on student learning, rather than on manageability and fit with current practice (Cohen, 1987). If they had a good grasp of how to share

authority with students, teachers could avoid disturbing confrontations and heavy-handed actions that suppress students' sense of responsibility.

Seeking more certainty, however, can create attachments to teaching goals, topics, and methods where certainty is easiest to obtain. Since the future is uncertain, striving for certainty pulls attention away from long-term plans and inspiring ideas to what is immediate, specific, and apparently obvious. A teacher in quest for certainty may favor content that can be tested by traditional objective examinations, rather than making decisions in light of worthwhileness. Rigidity and narrowness in classroom life, rather than flexibility and breadth, may be outcomes of a quest for certainty.

Too much uncertainty may be disabling, but too much certainty can lead to boredom and stagnation or to the mistaken sense that teaching is mechanical. Suppose that instead of "uncertainty," one spoke of "openness," "awareness of possibilities," "fluidity," or "freedom from rigidity." Uncertainty may be vital to practice in all professions (Schön, 1983). Benefits of greater certainty must also be weighed against disadvantages arising from ways an increase may be obtained. Teachers can, for example, reduce uncertainty about student understanding by asking more questions. Yet benefits of questioning "must be weighed not only against its potential discomfort to individual students but also against the strain it puts on the social relationships within the classroom as a whole" (Jackson, 1986, p. 69). As an essential, driving force in teaching, uncertainty is a tension that cannot and should not be removed (McDonald, 1986).

The virtues of uncertainty are obscured by its negative connotations. In part, teaching is an art whose impact comes through interweaving the expected and the surprising. An artistic work of depth continues to reveal

new facets. A lesson or assignment likewise has depth if, while conforming on the whole to a pattern, it provides unexpected opportunities for teaching and learning. Teachers should entertain these tempering thoughts about certainty's virtues, so that they can take a moderate stance, rather than rooting out uncertainty wherever they find it. Balancing openness and predictability is difficult and dependent on context, while crucial to teaching and the learning of students and teachers alike. Understanding the various aspects of uncertainty should help in continuing to strive for a productive balance, as well as in reducing uncertainties where appropriate.

Learning About Uncertainties

Teachers will become aware of many uncertainties on their own, especially uncertainties about teaching, learning, and classroom authority. Other aspects of uncertainty are less visible. Consider that constructivist views of student and expert knowledge are at odds with the commonly held assumptions that children will understand things properly if they are clearly explained and that the received truths of the curriculum can be taken for granted. Also, some awareness of uncertainty seems to diminish over time. Thus, teachers often become used to their modes of assessment and forget that inferences about student learning may be partial or mistaken.

Being prepared for uncertainties includes understanding them. Apart from its intrinsic value, understanding is important for developing an appropriate stance toward uncertainty, maintaining openness and flexibility, and deciding when uncertainties might be reduced through study and effort. But how much should beginning teachers understand about the uncertainties they face? Should educators feel satisfied that teachers are likely to recognize some uncertainties or should they try to bring their full range to teachers'

attention? Should teacher educators keep awareness of uncertainty from slipping away?

As adult learners, teachers have a large say in their curriculum--probably larger than they realize. In college courses, they can choose where to put their energies, where to go beyond requirements, and where to seek help from faculty and peers. In their first years, teachers can decide what to continue studying, and how and when to seek assistance or advice. In either case, teachers play a primary role in assessing their progress: What are they learning? What good will it do them as teachers or as people? How much more can they expect to learn? Their relative autonomy means that teachers also face perplexing choices about what to study, whom to consult, whether to admit their uncertainties, or what to do about them.

Appreciating the extent and varieties of uncertainty can, after all, be unsettling. Dangers of confusion, loss of confidence, or anarchy complicate teacher preparation. Teacher educators must prepare their students for uncertainties without suggesting that there are no bases for authority, order, and instructional choices. Compared with most of their students, teachers know more about instructional content, including criteria of worth. Teachers may not be dead certain about what and how to teach or why, but they have better grounds for assessing most choices than their students. Witless relativism or the cynical positions that "anything goes as long as you can come up with a reason" or "nothing works, so why bother" confuse uncertainty with anarchy. Just as teachers should be judicious in their pursuit of certainty, teacher educators should be prudent in their efforts to raise teachers' awareness of uncertainty. Uncertainty militates against dogmatism, but it is no excuse for anarchy.

One possible compromise would be to limit attention in preservice programs to uncertainties most salient to beginners, who are otherwise in danger of being overwhelmed. Further uncertainties could then be introduced in inservice education. This staged approach has two drawbacks. First, since the content of inservice education is often largely at their discretion, many teachers might not choose to learn more about uncertainty. Growing understanding of uncertainties in teaching would then be avoided rather than postponed. Second, teachers may establish convictions of certainty that will be difficult to shake. The belief that instructional content is unproblematic, for example, is often supported by teachers' own school experiences. If the seeds of some uncertainties are not planted in preservice programs, they may never be able to take root.

It is, therefore, desirable to help teachers see a greater range of uncertainties than most will discover on their own, even though this may entail raising their levels of anxiety and concern. Everyday classroom experience is unlikely to surface some uncertainties (e.g., about social organization or instructional content) because they do not interfere with running a well-functioning classroom. Raising awareness of hidden uncertainties can draw teachers' attention to more distant, yet inspiring aims, such as long-term learning that is faithful to evolving disciplinary knowledge and ideals of autonomy and responsibility for teachers and students.

It is instructive to compare teaching with public management. Public managers also have greater uncertainties than they typically recognize. From their own perspective, these managers have few incentives to increase their awareness of uncertainty. They can function well with a false sense of certainty, because their success is judged by whether they can make a decision

that others accept, not by whether their decisions are most likely to increase the general good. From the public's point of view, however, it would be better for these managers to recognize how their policies might go awry.

Uses and Limits of Routines

Understanding could lead to despair if teachers had no hope of reducing their uncertainties to manageable and productive levels. This is not the case. Increasing pedagogical knowledge and skills helps teachers to make reasonable, rapid choices; anticipate events; assess understandings; and find acceptable postures of authority. Habits of thought and action reduce perceived complexity and increase predictability. If students regularly exchange critiques of each others' work, both teachers and students know what to do. If a teacher always constructs social studies quizzes by writing one item for each textbook section, testing uncertainties diminish. Mastering routines and learning how to generate them prepares teachers to structure classroom events and also frees their attention for dealing with the unexpected (Clark & Peterson, 1986).

Routines are a specific response to the general problems of uncertainty; hence considerations raised earlier apply here also. While routines can reduce uncertainties, having more routines does not entail better teaching. Some routines have questionable instructional results. Imagine, for example, mathematics instruction entirely composed of routines for handing out and correcting ditto sheets or a classroom in which discussion and student ideas were paramount at all times. Or consider instructional planning reduced to turning textbook pages. In some cases, increasing uncertainty is preferable to relying on routines.

Routines can become so entrenched that teachers continue using them even when their results are not satisfactory (Clark & Peterson, 1986). Conversely,

> teachers are often temporarily confused by unexpected success (simply because it is unexpected) . . . [or find] that unexpected events are somehow troubling even when desirable (because we tend to become well adjusted to and eventually to prefer what we have come to expect). (Brophy, 1983, p. 651)

Unexpected opportunities and difficulties may be good reasons for interrupting standard procedures. Lacking capacities for ready adaptation may lead to foregone teachable moments (Shroyer, 1981/1982). Being prepared for uncertainty includes being flexible enough to break out of a routine when appropriate and being able to do something sensible after abandoning the shelter of established patterns (Bromme & Brophy, 1986).

Increasing Certainty Where Appropriate

Teachers can reduce some uncertainties by deepening and strengthening their pedagogical knowledge and skills during initial preparation or later in their careers. At times, though, getting insights from colleagues, books, or college faculty may be impossible or too time-consuming. Preparing for uncertainties includes knowing both how and when to attempt their reduction. A great support for continuing learning is being generally alert to what (inconveniently) contradicts one's assumptions. While one may feel, for example, that eager discussions are to be prized, it is helpful to be on the lookout for contributions that suggest wild misunderstandings or to call on quiet students when that can be done in a tactful way.

A more specific goal is developing a sense of when it is worth the costs to work for greater mastery of teaching subjects. Teachers cannot study everything intensively, and the best rule for learning need not be to study

whatever makes one feel least sure of oneself. Being prepared here means pursuing routes to subject knowledge that are propitious and practicable.

Responsibly Coping With Residual Uncertainties

Even given routines and continuing learning, teaching remains uncertain. While a reasonable measure of uncertainty adds interest and challenge, stress is a side effect. Worrying about one's knowledge and effectiveness can add to the mental and emotional costs of an already demanding job. Students may also suffer if they sense a teacher's lack of confidence. Part of being prepared for uncertainty is knowing how to cope with residual uncertainties--by talking, for instance, with other teachers and combining brisk assurance with second thoughts.

Communicating Teachers' Sense of Uncertainty

Talking to other teachers can ease the strain of residual uncertainties in three ways. First, being able to talk about one's doubts and fears with one's colleagues is a relief. Recognizing that uncertainties are endemic can relieve unjustified feelings of personal failure. Second, their conversations can remind teachers that uncertainty is an essential driving force in teaching, not merely a deficiency and worry. Third, if teachers can articulate uncertainties among themselves, they may become able to communicate them to others, which might reduce inappropriate pressures for certainty. The organization of U.S. schools, their norms, and facts of classroom life, however, inhibit teacher talk and admissions of uncertainties. In addition, theories of teaching and educational policy often suppose that

> teaching is at best simply the rational application of means to given ends. In this light, all the ambiguity, irrationality, and conflict which teachers are used to feeling in their bones, if not used to talking about, are simply evidence of teaching failure. (McDonald, 1986, p. 377)

Yet McDonald (1986) also describes how barriers have been surmounted. In monthly meetings over beer and pizza, he and other teachers discussed incidents in their work lives. Their conversations deepened appreciation of certainty's limits and resulted in essays about educational scholarship and policy through which the group broadened public awareness:

> What if teachers, recognizing the uncertainty in their work, raised their voices instead of growing silent? And what if theorists recognized that intimate knowledge of this uncertainty was exactly what was missing from both their theories and the policies these theories provoke? (p. 362)

Combining Brisk Confidence With Second Thoughts

Nevertheless, teaching and learning require decision, not helpless hesitation. Decisive action, however, may give the appearance of certitude. Indeed, it is this appearance that deceives novice teachers into thinking that their experienced colleagues are sure of their subjects, students, and efficacy. Brisk confidence can still be helpful. Time spent agonizing about each action or interpretation could put a stop to classroom life. Learners can throw themselves into their studies if they believe in their teachers' confidence; parents, likewise, can then trust in the direction of their children's learning. Both parties are--and should be--relieved by teachers' acceptance of responsibility.

Brisk confidence does not mean that teachers should behave as though their actions could never be questioned. Projections of absolute certainty would be dishonest, as would constant professions of doubt. Both would interfere with teaching and learning to teach. Hence, teachers must combine reliance on themselves and their students with a habit of reconsidering the sources and consequences of their actions. Their confidence must be based on openness to changes suggested by second thoughts (Buchmann, 1984), not on the

false assumption that teachers always know best. Like policymakers and researchers, teachers must maintain a "double consciousness" (Scheffler, 1984, p. 163), committed to taking action and to probing and revising their practice in the light of empirical and normative consequences.

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